Breeding Biology of some Species of *Pseudophryne* (Anura: Leptodactylidae) of the Southern Highlands, New South Wales

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ABSTRACT

Populations of *Pseudophryne corroboree, P. dendyi* and *P. bibroni* in the highlands and tablelands of south-eastern N.S.W. breed when temperatures are decreasing. In *P. corroboree* the onset of breeding is negatively correlated with altitude. Modal clutch sizes of the three species are as follows: *corroboree* (20-29), *dendyi* (80-89), *bibroni* (80-99). In general fecundity is not related to female body length.

INTRODUCTION

Most species of the genus *Pseudophryne* are terrestrial breeders, laying their eggs in burrows in soil, under leaf litter, or in moss in areas which are subject to seasonal inundation. The number of relatively large, heavily yolked eggs laid varies from 20 in *P. australis,* to well over 100 in *P. bibroni.* From the information available (Table 1), it appears that most species breed during the late summer to late autumn or early winter. Both *P. australis* and *P. occidentalis* are atypical in this respect as the former species is reported to breed throughout the year after rain (Harrison, 1922) and the latter "breeds after summer rains and when these fail . . . breeds after the first warm rains of winter" (Main, 1965).

In *P. corroboree, P. dendyi* and *P. bibroni,* the male constructs the burrow which also serves as a calling site (Pengilley, 1971a). Colefax (1956) reported that in *P. corroboree* the female performs this task as he observed in the laboratory, females making burrows in moss after injection with *Bufo marinus* pituitaries. In nature, no female has been observed to make a burrow.

From the literature, species appear to differ in their behaviour after egg laying. Males of *P. douglasi* (Main, 1964), *P. coriacea* (Straughan, 1963, pers. comm.), *P. dendyi* (Moore, 1961), *P. corroboree* (Jacobson, 1963) and females of P. *australis* (Harrison, 1922) have been found in burrows containing eggs. Jacobson (1963) reported that both sexes of *P. bibroni* remain with the eggs. This is contrary to my observations on this species, where only males have been found in nests containing eggs.

TABLE 1.

Summary of breeding biology of *Pseudophryne* species

Species	Calling season	Breeding season	Clutch Size	Egg Diam. (mm)	Length of Larval life (days)	Locality	References
Pseudophryne bibroni		Apr.-June					Fletcher, 1889
		Apr.-June	130	2.0	150-180	Sydney, N.S.W.	Harrison, 1922
		Apr.-May		2.1			Moore, 1961
			260	2.0			Jacobson, 1962
		Mar.-May				Melbourne, Vic.	Littlejohn, 1963
		Feb.				New England, N.S.W.	Pengilley, unpubl.
	Mar.-June	Apr.-May	80-99[b]		120-150	Southern Highlands, N.S.W.	Pengilley, unpubl.
					180-210	Melbourne, Vic.	Martin, 1965
P. dendyi		Feb.	85	2.2		Jindabyne, N.S.W.	Moore, 1961
	Jan.	Jan.-Feb.	80-99[a]		180-210	Snowy Mts., N.S.W.	
		Feb.				Clyde Mtn., N.S.W.	Pengilley, unpubl.
		March			180-210	Coree Flats, N.S.W.	
P. corroboree		Dec.-Jan.	12	3.5	180-210	Snowy Mts., N.S.W.	Colefax, 1956
	Dec.-Feb.	Jan.-Feb.	20-30[b]		180-210	Snowy Mts., N.S.W.	
	Dec.-Feb.	Jan.-Feb.	20-30[b]		180-210	Snowy Flats, A.C.T.	Pengilley, unpubl.
	Jan.-Apr.	Feb.-Mar.	20-30[b]		180-210	Coree Flats, N.S.W.	
P. semimarmorata		Mar.-May				Melbourne, Vic.	Littlejohn, 1963
		Mar.-May				Tasmania	Parker, 1940
					180-210	Melbourne, Vic.	Martin, 1965
P. australis		Nov., Jan., May					Fletcher, 1889
		Sept.					
		All year?	20	2.8	28	Sydney, N.S.W.	Harrison, 1922
	Aug.-Mar.	Aug., Jan.	15		30-40		Moore, 1961
			10-20	3.0-3.5			Jacobson, 1962
	Aug.					near Mittagong, N.S.W.	Pengilley, unpubl.
	Jan.					Sydney, N.S.W.	Pengilley, unpubl.
P. coriacea		March	110-180			North Coast, N.S.W.	Straughan, 1963 (pers. comm.)
	Feb.					North Coast, N.S.W.	Pengilley, unpubl.
P. guentheri	Mar.-June	Winter			40-50		Main *et al*, 1959
	Apr.-May	Apr.-May			90-120		Main, 1965
P. occidentalis	Jan.-June	Summer-early winter			40-50		Main *et al*, 1959
	Dec.-Mar.	Summer-early winter			40-50		Main, 1965
P. douglasi		May	89		90-120		Main, 1964

[a] based on 1964 data [b] modal class size

Because of the paucity of information available on the breeding biology of species of this genus, a number of populations of *P. corroboree, P. dendyi* and *P. bibroni* in the Southern Highlands and Southern Tablelands were examined as frequently as possible during the breeding seasons. During the examination of these areas, particular attention was placed on obtaining fairly accurate information on the onset and duration of the calling and breeding seasons of the three species. In the case of the calling season, it was thought that the time when the males were first heard calling probably indicated that males were beginning to move into the breeding areas. Known burrows in the breeding areas were periodically checked to see whether there were any males present. The examination of burrows during these visits also provided information on fecundity and on the date of commencement of breeding and fecundity.

MATERIALS AND METHODS

Locations of the study areas have been given elsewhere (Pengilley, 1971a). Most of the areas that were visited more than once during the calling and breeding seasons are situated in the montane or subalpine zones of Costin (1954) within south-eastern N.S.W.

The main study area, which is located at Coree Flats (alt. 1036m) on the Brindabella Range near the north-western corner of the N.S.W.-A.C.T. border, is a wet heath surrounded by dry-wet sclerophyll forest (*Eucalyptus dalrympleana-E. robertsoni* alliance). Within the wet heath, the majority of breeding animals were concentrated at the northern and southern parts where the vegetation had been partly modified by man. In these small areas, the herbaceous layer consisting of a diverse assemblage of snow grass (*Poa caespitosa*), species of *Agrostis,* and various herbs and mosses, (Fig. 1) provided suitable breeding sites for *P. corroboree* and *P. dendyi.* Snowy Flats (alt. 1646 m) is situated on the Brindabella Range approximately 27 km south of Coree Flats. It is essentially a valley bog surrounded on the slopes by subalpine woodland (*E. pauciflora*) underlain by a well-developed and virtually continuous sward of snow grass (*Poa caespitosa*). The bog is an example of the *Carex gaudichaudiana-Sphagnum cristatum* bog alliance (Costin et al., 1959) of which a large part consists of active sphagnum moss showing hollow-hummock development (Fig. 2). Most burrows of *P. corroboree* were found in sphagnum bordering pools or in between pools.

The area here called Smiggin Holes is about 3.2 km north of the village of Smiggin Holes on the Smiggin Holes-Guthega road at an elevation of about 1650 m. It is a small sphagnum bog surrounded by disclimax heath (Costin, et al., 1959), which was originally subalpine woodland.

Boggy Plain (alt. 1585 m) is located about 5 km south-east of Smiggin Holes on the same mountain range. As the name suggests, this was once a very wet sphagnum bog but due to repeated burning off and grazing of sheep, it is now very dry and there is little actively growing sphagnum.

Round Mountain is 39 km NNW of Smiggin Holes at an elevation of 1585 m. It is a small bog surrounded by subalpine woodland. Little Thredbo River Flats

Fig. 1. Breeding sites of *P. corroboree* and *P. dendyi* at the southern end of Coree Flats. Burrows of both species tended to be concentrated around ill-defined depressions in the heath similar to the one shown in the extreme right of the photograph.

Fig. 2. Breeding site of *P. corroboree* at Snowy Flats, A.C.T. The majority of breeding adults were found in the sphagnum bordering the pool (arrowed).

(alt. 1280 m) is located near the junction of the Little Thredbo and Thredbo Rivers in the Thredbo Valley, approximately 7 km south of Smiggin Holes. The area consists of a disturbed sphagnum bog surrounded by wet sclerophyll forest.

The area here called Yarrangobilly is actually 2 km south-east of the village of Yarrangobilly on Highway 18 at an elevation of approx. 1260 m. It is part of the western montane zone of Costin (1954) and consists mainly of wet sclerophyll forest.

Weather data for two highland localities (Smiggin Holes and Yarrangobilly) and one tableland locality (Canberra) are shown in Fig. 3.

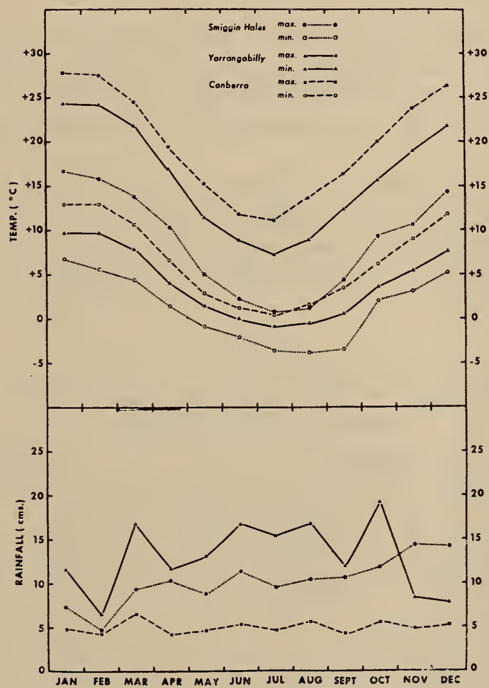

Fig. 3. Upper Graph. Mean maximum and minimum monthly screen temperatures of three selected stations in the Southern Highlands and Tablelands of N.S.W. Lower Graph. Mean monthly rainfall in centimetres for the same three stations.

Rainfall and temperature data for Coree Flats for the years 1963 to 1965 have also been reported in another publication (Pengilley, 1971b). During the early part of 1965, drought conditions prevailed over most of south-eastern N.S.W. Very little rain was recorded at Coree Flats during the months of January and February, and no rain was recorded in March. Less than 5 cms of rain fell in each of the four subsequent months.

A preliminary statement on the taxonomic status of the three species studied has been given in an earlier publication (Pengilley, 1971a).

The number of eggs laid by each of the three species was determined (1) by counting the number of eggs in the body cavity and oviducts of females that had ovulated, and (2) by counting eggs, which were of one embryological stage of development, that were deposited in burrows. The snout-urostyle measurements refer to those obtained from preserved adults which were collected during the breeding season.

OBSERVATIONS

Size at Sexual maturity

Snout-urostyle lengths of males *P. corroboree* found in burrows during the breeding season and of gravid females are given in Table 2. At any given locality, males are generally a few millimetres smaller than females. There is a gradual but parallel increase in the mean size of both males and females with increase in altitude.

At Coree Flats, *P. corroboree* probably attains sexual maturity at 3 years. This rather crude estimate of the length of the pre-reproductive period is based on size attained by juveniles at the end of first year of their terrestrial phase, but in their second year of growth following fertilization. At this stage in the

TABLE 2.

Snout-urostyle lengths of adult male and adult female *P. corroboree*. Southern Highlands, N.S.W.

	MALES		FEMALES	
Locality	No. in Sample	Mean Snout-urostyle length (mm) ±SE‡	No. in Sample	Mean Snout-urostyle length (mm) ±2SE
Coree Flats* (alt. 1040 m)	51	22.0 ± 0.30	57	24.6 ± 0.26
Bull's Head* (alt. 1220 m)	—	— — —	8	25.2 ± 1.02
Snowy Flats* (alt. 1650 m)	53	22.7 ± 0.26	5	26.0 ± 0.62
Yarrangobilly (alt. 1280 m)	20	22.0 ± 0.56	5	25.0 ± 1.16
Smiggin Holes† (alt. 1650 m)	70	23.7 ± 0.22	12	27.0 ± 0.70
Round Mountain† (alt. 1590 m)	42	24.0 ± 0.34	9	27.6 ± 0.92

* Localities in the Brindabella Range
† Localities in the Snowy Mountains
‡ SE = Standard error

life cycle, juveniles ranged from 7.5 to 10.0 mm in snout-urostyle length and at the end of their first year of terrestrial growth they range from 9.0 to 14.0 mm.

P. dendyi males are also slightly smaller than females, but they tend to be slightly larger than males of *P. corroboree* from the same altitude (Fig. 4), but unlike the situation in *P. corroboree,* there is no clearly defined trend in size with altitude. There are, however, some differences between localities differing greatly in altitude over a short distance. For example, males from Boggy Plain (alt. 1585 m) are larger than those from Little Thredbo River Flats (alt. 1158 m) and similarly males from Clyde Mountain (alt. 610 m) on the Coastal Range are significantly larger than those from near sea level at Moruya.

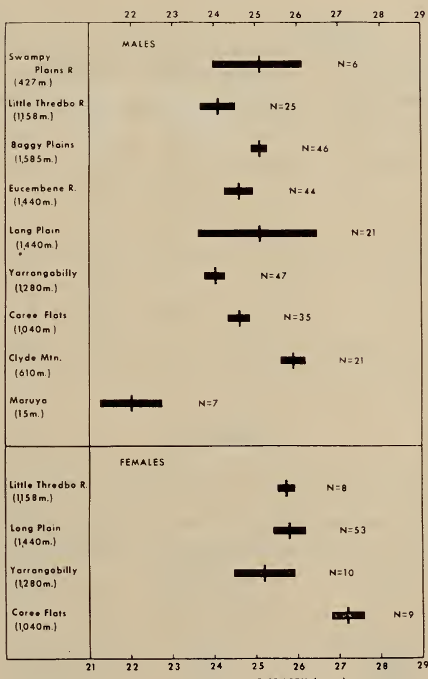

Fig. 4. Snout-urostyle lengths of adult males and females of *P. dendyi.* Thin vertical lines represent the means and the thicker horizontal bars represent the means ± 2SE.

Both adult male and adult female *P. bibroni* (Table 3) are approximately the same size as most of the Southern Highland populations of *P. dendyi.*

Number of eggs laid

P. corroboree

The clutch size of *P. corroboree* based on counts of eggs in gravid females ranged from 16 to 38, the mean clutch sizes for the two samples (Snowy Mts.

and Brindabella Range) being 26.4 and 24.0 respectively. The larger mean clutch size of the Snowy Mountains females is attributable to the larger mean size of these females (Table 2). However, from the small sample of 24 females obtained from the Snowy Mountains there is no relationship between snout-urostyle length of the female and fecundity, although fecundity is correlated with size in the sample from the Brindabella Range (Fig. 5).

TABLE 3.

Snout-urostyle lengths (sub) of adult male and female *P. bibroni*, Southern Tablelands, N.S.W.

Locality	MALES: Number in Sample	MALES: Mean SUL (mm) ± 2SE	FEMALES: Number in Sample	FEMALES: Mean SUL (mm) ± 2SE
11.2 km. south of Yass, N.S.W.	25	24.8 ± 0.5	5	25.6 ± 1.2
Mountain Creek Road, N.S.W.	11	23.8 ± 0.8	2	24.2
Uriarra, A.C.T.	19	24.4 ± 0.5	2	25.4

TABLE 4.

Percentage of nests of *P. corroboree* containing a given number of clutches*.

Locality	Year	Number of nests examined	Percentage of nests containing a given number of clutches: 1	2	3	4	5
Coree Flats	1963	104	48.3	31.7	13.3	5.0	1.6
	1964	136	60.0	34.3	5.0	0.6	0.0
	1965	7	77.8	22.2	0.0	0.0	0.0
	1967	21	33.3	25.0	23.0	9.0	0.0
Snowy Flats	1964	83	45.7	43.8	7.7	1.9	1.0
	1965	14	75.1	18.8	6.3	0.0	0.0
Smiggin Holes	1964	14	49.9	42.8	7.1	0.0	0.0
	1965	58	67.2	29.5	3.2	0.0	0.0
Round Mtn.	1965	28	61.8	38.2	0.0	0.0	0.0

* For this purpose, a clutch consisted of less than 30 eggs at the same stage of development. If two batches of eggs were at different stages of development, they were considered to be two clutches even though each batch may have consisted of less than 15 eggs.

Colefax (1956) reported that *P. corroboree* (Snowy Mountains) lays 12 eggs. It is evident from the counts of eggs in gravid females and the number of eggs per nest (Figs. 6 and 7) that this number represents only part of the egg complement of a female. A small percentage of burrows, generally less than 20% do contain less than the minimum clutch size recorded. Most, however, contain one or more clutches of eggs (Figs. 6 and 7 and Table 4) indicating that a burrow is used by more than one female as an oviposition site.

P. dendyi

The only report in the literature on the number of eggs laid by *P. dendyi* is that of Moore (1961) who found 85 eggs in a nest near Jindabyne, N.S.W. The number of mature eggs contained in the ovaries of 30 gravid females ranged from 35 to 102. There was no relationship between size of female and fecundity.

In 9 nests of *P. dendyi* at Coree Flats examined in 1963, the number of eggs ranged from 45 to 154, the mean being 101.1. Examination of 36 nests during the 1964 breeding season showed that modal clutch size was within the range 80-89 (Fig. 8) and the mean was 81.8. In 1965, there was a reduction in the modal (40-49) and mean (65.0) 'clutch' size.

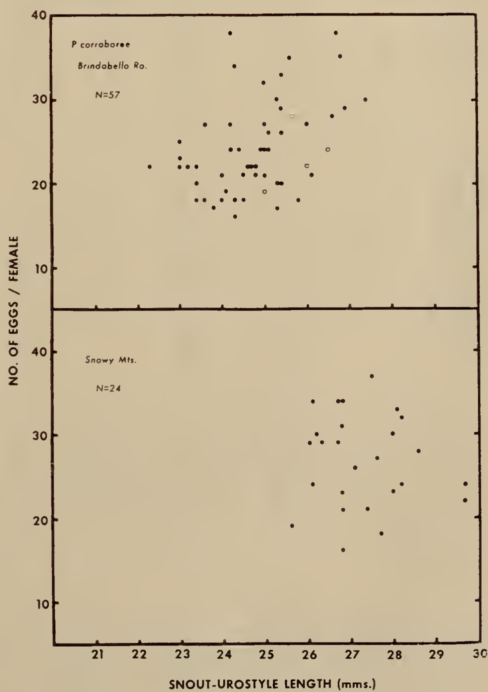

Fig. 5. Plot of the number of eggs found per female against snout-urostyle length. The open squares represent specimens obtained from Snowy Flats, Brindabella Range.

TABLE 5.

Calling and Breeding Seasons of *P. corroboree*, Southern Highlands, N.S.W.

Locality	Season	Males in breeding area, not calling or only a few calling	Large numbers of males calling	Breeding season	Last male seen in breeding area
Smiggin Holes	1963-64	—	4th week Dec.	3rd week Jan.-?	2nd week Feb.
	1964-65	—	—	4th week Jan.- 2nd or 3rd week Jan.	1st week April
	1965-66	—	—	1st week Jan.-?	—
Round Mountain	1964-65	—	—	4th week Jan.- 4th week Feb.	—
	1965-66	—	—	1st week Jan.-?	—
Snowy Flats	1963-64	2nd week Dec.	1st week Jan.	3rd week Jan.- 2nd week Feb.	1st week Mar.
	1964-65	—	—	1st week Feb.-?	1st week April
	1965-66	—	1st week Jan.	4th week Jan.-?	—
Coree Flats	1962-63	—	—	1st week Mar.- 3rd week Mar.	4th week April
	1963-64	2nd week Jan.	2nd week Feb.	1st week Mar.- 4th week Mar.	2nd week April
	1964-65	1st week Jan.	3rd week Jan.	4th week Mar.-?	4th week April
	1965-66	4th week Dec.	—	4th week Feb.-?	—
	1966-67	3rd week Dec.	—	1st week Mar.-?	? 2nd week April

P. bibroni

This species is recorded as laying 130 (Harrison, 1922) and 260 eggs (Jacobson, 1962). From 12 nests at Uriarra, A.C.T., the modal 'clutch' size was between 80-99 (Fig. 8) the mean being 85.3. Since only three gravid females were dissected, it is not known whether there is any relationship between body length and egg complement. The clutch size of these females ranged from 82 to 109 (Fig. 9).

Calling and Breeding Seasons

Male *P. corroboree* have been heard calling from early December until early April at Snowy Flats and from late December until mid-April at Coree Flats (Table 5). Thus males are present in the breeding areas 4 to 8 weeks before breeding commences and some males remain until 2 to 4 weeks following egg

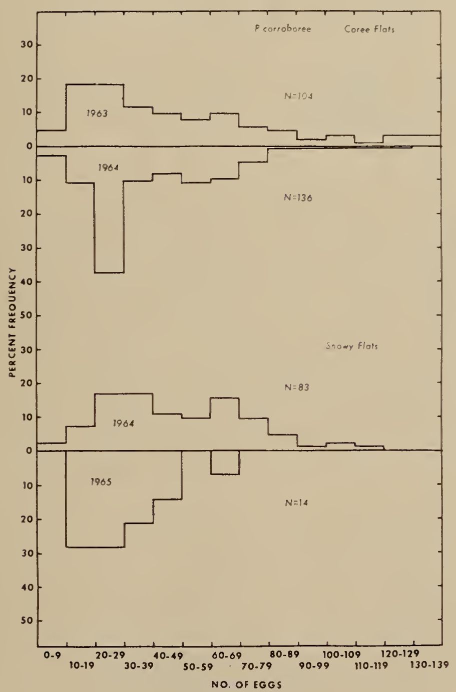

Fig. 6

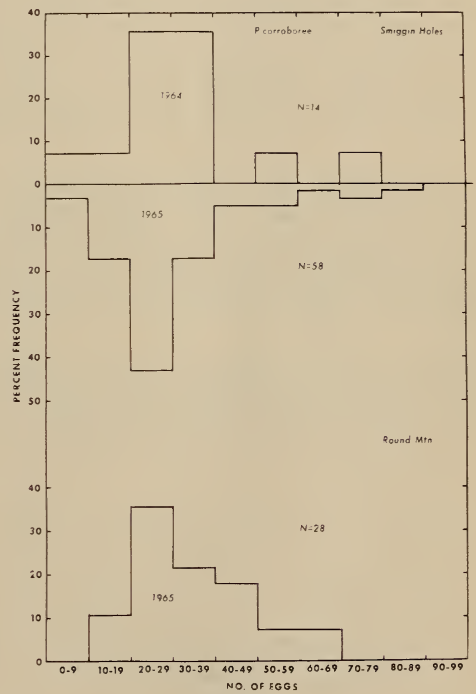

Fig. 7

Fig. 6. Frequency distribution of the number of eggs found in nests of *P. corroboree* at two localities on the Brindabella Range. The number of nests (N) and the year during which they were examined are shown on the diagram.

Fig. 7. Frequency distributions of the number of eggs found in nests of *P. corroboree* at two localities in the Snowy Mountains region. The number of nests (N) and the year during which they were examined are shown on the diagram.

laying. On the limited and qualitative information available, both migration of males into and out of the breeding areas appears to be related to altitude.

The onset of breeding as evidenced by the presence in burrows of recently-laid eggs or of eggs in the early stages of development is more clearly related to altitude than is the initiation of the influx of males into the breeding area. Populations of *P. corroboree* in the sub-alpine zone (>1524 m) generally begin breeding in the latter half of January, but those at lower altitudes (about 1000 m) do not commence until early March. This negative relation between altitude and the commencement of egg laying appears to be consistent from year to year (Fig. 10 and Table 5).

However, in 1965, breeding was much later at all localities except for Round Mountain and Smiggin Holes in the Snowy Mountains when recently-laid eggs were found on January 24 and 25. If allowances are made for errors

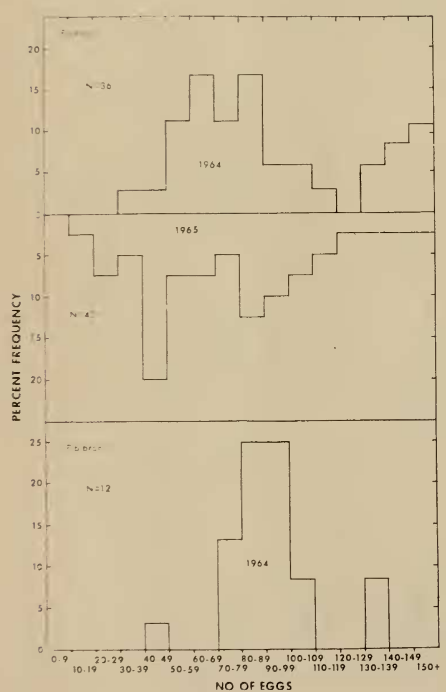

Fig. 8

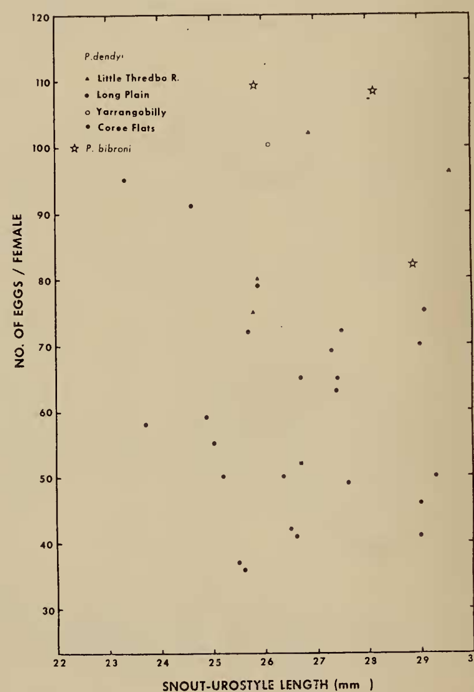

Fig. 9

Fig. 8. Upper Graph. Frequency distribution of the number of eggs found in nests of *P. dendyi*.
Lower Graph. Frequency distribution of eggs found in 12 nests of *P. bibroni* at Uriarra, A.C.T. during the 1964 breeding season.

Fig. 9. Plot of the number of eggs found in gravid females of *P. dendyi* and *P. bibroni* against snout-urostyle length.

in estimating the date of commencement of breeding, the dates given do not differ greatly from those of the previous year. At both Snowy and Coree Flats, however, breeding was two to three weeks later than the previous year.

Colefax (1956) recorded *P. corroboree* breeding in the latter half of December at Alpine Hut (alt. approx. 1 768 m). If 1964 is considered to be a normal season for *P. corroboree,* then from the relationship between altitude and the onset of breeding, the Alpine Hut population would have started breeding towards the end of December.

P. dendyi and *P. bibroni*

The breeding of *P. dendyi* and *P. bibroni* tends to follow the same pattern as of *P. corroboree* in that the males migrate into the breeding areas some weeks before breeding commences.

During 1965, males of *P. dendyi* were observed in the breeding areas towards the end of January at both Boggy Plain and Little Thredbo River Flats, but were not heard calling until early March at Coree Flats. By the second week of April, the majority of males had moved out of the breeding area at Boggy Plain, but this did not take place until at least early May at Coree Flats as males were still present on April 26.

The close correspondence seen in breeding schedule and altitude of *P. corroboree* was not so apparent in *P. dendyi* during 1964 and 1965. In 1964 at 1585 m breeding began towards the end of January and at 1219 m eggs were first noticed towards the end of the second week in February. Delayed breeding was also observed in 1965 when most populations bred approximately two weeks later than in the previous year.

Male *P. bibroni* were first heard calling at 610 m on April 13, 1964, but as these populations were not visited before this date, calling possibly could have begun much earlier. Males were last heard calling towards the end of May of the same year.

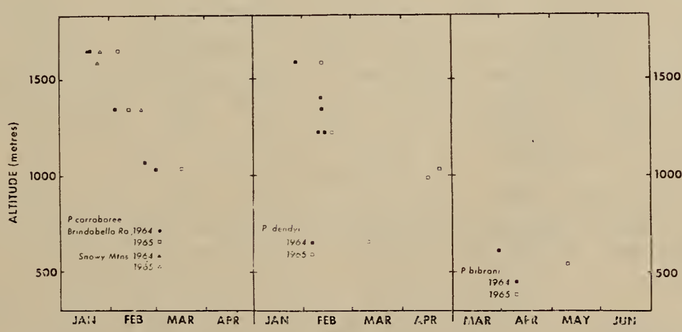

Fig. 10. Time of onset of breeding in *P. corroboree, P. dendyi* and *P. bibroni* at various altitudes in the Southern Highlands and Southern Tablelands, N.S.W.

The data available for *P. bibroni* are too limited to indicate whether breeding schedule is related to altitude. However, some observations made in 1963 suggest that breeding in this species is partially dependent on latitude. *P. bibroni* was found breeding near Pt. Lookout (alt. approx. 1 200 m) New England Tablelands, N.S.W. on January 16, 1963. Three days later (January 19) in the Blue Mountains, males were found calling in burrows but no eggs were present. At Canberra, however, males were not heard calling until towards the end of March.

DISCUSSION

Where *P. corroboree* and *P. dendyi* are sympatric, there is some overlap in breeding seasons, with *P. corroboree* tending to breed much earlier than *P. dendyi.* At Coree Flats, *P. dendyi* males begin to move into the breeding area at the time when *P. corroboree* is just beginning to breed. There is always the possibility then that *P. dendyi* males could mate with *P. corroboree* females. However, the courtship calls of the two species are quite different (Pengilley, 1971a) and this undoubtedly plays some part in enhancing reproductive isolation between the two species.

Where *P. corroboree* and *P. dendyi* are allopatric there is some evidence which suggests that there is greater overlap in breeding seasons. During 1964, in the Snowy Mountains, *P. dendyi* began breeding about one week later than *P. corroboree,* and if a correction is made for the difference in altitude between the two localities, there is very little difference between the times at which they bred. In 1965, however, the overlap was not as great as the time of breeding of both species (at the same altitude, but at different localities) differed by three weeks.

The drought of 1965 affected the breeding of all populations below 1560 m. in one of two ways: breeding was either restricted to very wet places in the breeding areas, or it was totally inhibited. No breeding of *P. corroboree* occurred in the main study area at the southern end of Coree Flats. A total of seven nests containing eggs were found, however, in two small areas bordering a small stream in the northern and western edges of the wet heath. In this area, male frogs were largely confined to the relatively moist, peripheral, ecotone of *Leptospermum myrtifolium* and *Epacris breviflora.* Only a few males were located in the central part which, in 1963 and 1964 had provided the most favourable breeding sites. It was estimated that the area suitable for breeding in this small part of the flat had been reduced to about 1% or less of the 1964 value.

At Coree Flats, *P. dendyi* was not as greatly affected by the drought as *P. corroboree* because it bred much later in the year when climatic conditions were less severe.

Populations of *P. bibroni* on the tablelands were also greatly affected by the drought. Males migrated to the breeding areas at 5 localities but eggs were found at only one of these.

At localities about 1500 m. on the Brindabella Range, and the Snowy Mountains, all populations of *P. corroboree* and *P. dendyi* bred. However, the breeding was not entirely successful as large numbers of eggs became desiccated and died as a result of the sphagnum drying up.

The demonstration of well-defined seasonal breeding in these species of *Pseudophryne* suggests that their reproductive activities are controlled by climatic conditions. Temperature and rainfall are considered as being the two most important climatic factors affecting reproduction in amphibia (Gallien, 1959; Noble and Noble, 1923; Smith, 1955). Although experimental evidence is available only for the effects of temperature (Van Oordt, 1960), there is much evidence (e.g. Savage, 1961) which suggests that one or both factors are influential in determining the onset of breeding. In *P. corroboree* and to a lesser extent in *P. dendyi,* it appears that the breeding schedule is determined by temperature but the precise thermal conditions necessary to induce breeding are not known, primarily because of the lack of records from different localities extending over a number of years. However, the rate of decline of temperatures during the period January to May may be of some importance. At Coree Flats, breeding was much later in 1965 than in 1964. In 1965, temperatures declined at the mean daily rate of 0.06°C, whereas in 1964 the rate was 0.12°C. Robinson (1965, pers. comm.) suggested that the slower rate observed in 1965, may have been responsible for delayed breeding in the winter-breeding lyre bird, *Menura novae-hollandiae* at a locality about 17 km. south of Coree Flats.

The rate of decline of temperatures is probably not the prime factor responsible for breeding of *Pseudophryne* in the subalpine zone, because these species begin breeding when temperatures are just beginning to decrease.

Although rainfall has been implicated as a stimulus for breeding in some species of *Pseudophryne* (Fletcher, 1889; Jacobson, 1963; Main, 1965) it seems from the data obtained on *P. corroboree* and *P. dendyi* that there is very little relationship between the two. Both species breed from late summer to mid-autumn, a period during which rainfall is generally minimal. The absence of rain, however, can affect reproduction by making the breeding sites too dry for egg deposition. In moist areas, at the same localities, breeding will occur.

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